CITY OF SPRINGFIELD, OREGON

DEVELOPMENT AND PUBLIC WORKS DEPARTMENT

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March 11, 2021

HIGH BANKS & THURSTON, P21152

Q. If the proof roll under 00643.50 exhibits deflection or pumping, what bid item is this repair work paid for under? *We are revising this spec section and changing two callouts on a detail sheet. This will be issued on Amendment #2.*

A. The intent is to place ICTB and proof roll. If the proof roll fails, we will sawcut and remove the failing material. A new 18" CTB section will then be placed back and will be paid under the bid item "18 INCH ICTB REPAIR".
Under materials, the 14" depth (2"-0") aggregate and 4" depth (1.75"-0") aggregate base courses are incorrectly shown and are intended to refer to the full depth asphalt concrete pavement repair locations shown on sheet E01. We will revise the materials section of this spec with the first addendum to show repair with CTB. The 14"/4" repair section is for full depth repair in the non CTB repair locations. 12" subgrade stabilization will be used to stabilize any failing subgrade under the full depth asphalt concrete pavement repair areas as well.

Q. Has SUB water confirmed that their waterlines will support the weight of the equipment needed to complete the In-Place Cement Treated Base work?
A. Yes, SUB has reviewed the plans and confirmed their lines can support the weight.

Q. Has SUB confirmed their water service lines are deep enough that they won't be hit during the In-Place Cement Treated Base work?
A. Yes, SUB has reviewed the plans and confirmed their lines are deep enough to avoid damage during CTB and paving operations. They stressed the importance of advance notification so they can have a "on-site safety watcher" on site per the special provisions.

Q. 00310.91 references landscape restoration work associated with retrofitting the ramps is included in Bid Item 45. Does this description include re-routing existing irrigation systems to get them out from under the new concrete? Can a bid item for irrigation repairs be added to the bid schedule to cover the costs for the irrigation repairs? A contractor can't see under the existing sidewalks how the existing irrigation systems are routed and therefore can't determine a cost to make the repairs.
A. No, at this point we are not going to add a bid item and the work will be considered incidental to the "retrofit existing sidewalk ramps" bid item.

Q. 00850 – Common Provisions for Pavement Markings says that "Projects with partial striping plans…document all existing striping..." Do the plans provided to us for bidding have enough information so that the Surveying Contractors don't need to include this work in their bids?
A. The plans provided are full striping plans. There is no need for documenting the existing striping. The surveyor will need to use the plans and electronic files to layout the new striping on the new roadway.

Q. 00867.00 Is there a list of City Approved Thermoplastic Materials?
A. The City does not have a list, attached are Product specs and a brochure of the products listed in the Specifications.

A PRODUCT PORTFOLIO OF

PREFORMED THERMOPLASTIC

DURABLE PAVEMENT MARKINGS

ENNIS-FLINT®

The Mark of Traffic Safety®

ISO 9001:2015 Certified Manufacturer and Distributor

ENNIS-FLINT

PreMark® by Ennis-Flint

No preheating surface required

PreMark Pavement Markings

- Heavy-duty, durable, intersection grade pavement marking material
- Complies with MUTCD; used primarily for regulatory markings on public streets, highways and private properties
- Supplied at 125 mil for cost-effective service life
- Lasts 6 to 8 times longer than paint
- No minimum ambient or road temperature requirements; pavement marking season can be extended into colder months
- Retroreflective; glass beads mixed throughout material so that as the marking wears new beads are exposed
- Precut; ready to use out of the carton
- Made at ISO 9001:2015 certified facility
- Simple 3-step application process with Ennis-Flint® 3000 EX Heat Torch

ViziGrip®

ViziGrip visibilty and anti-skid treatment can be added to any of the PreMark preformed thermoplastic lines, legends, arrows, and other designs offered in 90-mil and 125-mil thicknesses.

PreMark Contrast Markings

Enhance contrast and improve visibility day and night with PreMark contrast markings for light-colored asphalt and concrete applications.

Border contrast markings available in white and yellow 125-mil PreMark material are retroreflective and skid resistant while the black contrasting border is skid resistant and non-reflective. The 4, 5 and 6 inch width white or yellow linear material has a 1.5 inch contrasting border. The 8 inch width linear material has a 3 inch contrasting border. For lines wider than 8 inches, use black linear PreMark material.

Block contrast markings are available in 125 mil and provide even greater visibilty. They are convenient to use because the two colors of material are interconnnected for easier handling and positioning.

BORDER CONTRAST

BLOCK CONTRAST

Regulatory Markings

Section 9C.02 *General Principles* of the 2009 MUTCD states that "markings used on bikeways shall be retroreflectorized." The *Guidance* statement reads, "... Consideration should be given to selecting pavement marking materials that will minimize loss of traction for bicycles under wet conditions." PreMark® pavement markings with ViziGrip® anti-skid treatment provide this safety measure.

Standard FHWA Designs

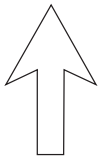
Bike lane symbols are standard in 90 mil. Thickness of 125 mil is available.

Bicycle Symbol
(3'4"w x 6'h)
Item 89230576LHS

Bicycle Rider
(3'4"w x 6'h)
2009 MUTCD
Item PM602006L

Shared Lane
Symbol
(3'4"w x 9'4"h)
Item PM600833LVG

Bicycle Loop
Detector
(1'1"w x 3'7"h)
Item 89230577LHS



Straight Arrow
(24"w x 6'h)
7" stroke
Item PM602005

BIKE Legend
(3'2"w x 4'h)
Item 89150248

LANE Legend
(3'6"w x 4'h)
Item 89150213

ONLY Legend
(3'1"w x 4'h)
Item 89150202

Block Contrast Markings

PreMark block contrast markings provide even greater visibility and durability for concrete and faded asphalt applications. The white symbols are treated with ViziGrip visibility and anti-skid treatment, which optimizes skid resistance and retroreflectivity while the black background is nonreflective with high skid resistant elements.

Standard FHWA Designs

Block contrast markings are available in 125-mil thickness and require EF 2-Part Sealer for application. Other word and symbol designs are available.

PM600700
"ONLY"
(8'w x 9'h)

PM600701
"AHEAD"
(10'w x 9'h)

PM600705
"STOP"
(8'w x 9'h)

PM600702-L
Turn Arrow
(8'w x 9'h)

Bike Boxes and Panels

Made with durable PreMark preformed thermoplastic material for use in high traffic areas subjected to vehicular traffic. The two colors of material are interconnected, allowing the user to easily handle and position the marking prior to heating. White symbols are retroreflective. Green portion is available as non-beaded with anti-skid elements on the surface and throughout. Solid colored 2' x 3' sheets can be used to fill in areas around the bike box or panels.

PreMark EF bike lane green material meets the chromaticity coordinates in the FHWA's Interim Approval for the optional use of green colored pavement in marked bike lanes. Available with retroreflective (VG: ViziGrip anti-skid treatment) or non-reflective (SK: Skid-Only) properties.

Standard FHWA Designs

White symbols and words are retroreflective. Standard designs are 90 mil with skid-only green background. If 125 mil or ViziGrip treated material is required, notify an Ennis-Flint sales representative at the time of order. Other word designs available.

PMSK6902757
FHWA "BIKE"
(4'w x 7'h)

PMSK6902758
FHWA "LANE"
(4'w x 7'h)

PMSK6902759
FHWA "ONLY"
(4'w x 7'h)

PMSK6902761
FHWA "XING"
(4'w x 7'h)

PMSK6902763
Bike Straight
Arrow
(4'w x 7'h)

PMSK6902762L
Bike Turn Arrow
(4'w x 7'h)

PMSK6902762R
Bike Turn Arrow
(4'w x 7'h)

PMSK6902764L
Bike Straight
Turn Arrow
(4'w x 7'h)

PMSK6902764R
Bike Straight Turn
Arrow
(4'w x 7'h)

PMSK6902767L
Bicycle Symbol
(4'w x 7'h)

PMSK6902766L
Bicycle Rider
(4'w x 7'h)

PMSK6902768L
Shared Lane
Symbol
(4'w x 7'h)

PMSK6902770L
Bike Loop
Detector
(4'w x 7'h)

ENNIS-FLINT

Preformed Thermoplastic VS. Other Marking Materials

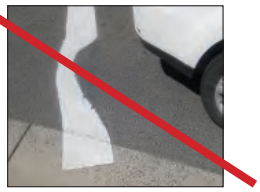
It looks better and lasts longer.

- Durable enough to last 6 to 8 times longer than paint
- At-a-glance recognition of uniform markings along a specified bike route
- Crisp edges and consistent appearance
- In compliance with Federal and local regulations
- Apply at any time of the year with a propane heat torch
- Retroreflective and anti-skid elements are added at the time of manufacturing to meet specifications and consistent quality control

Paint typically used with a stencil leaves a broken image and wears much quicker.

Cold plastic tape's bond performance is minimized in cold weather climates.

Hot-applied thermoplastic is cumbersome to apply when using stencils for symbols and legends and often results in "alligator" cracks with roughness around the edges.



Cold plastic tape tends to shear with heavy turning traffic at near-intersection applications subjected to vehicular use.

Life Cycle Performance and Savings with PreMark® Bike Lane Markings

Preformed Thermoplastic
Block Contrast Marking
Applied cost approximately $375
(includes material and application)

Waterborne Paint
Applied cost approximately $150
(includes material and application)

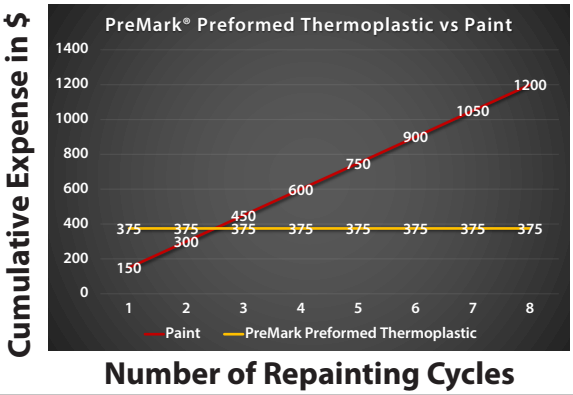
Cold Plastic Tape
Applied cost approximately $200
(includes material and application)

EACH PHOTOGRAPH TAKEN AFTER ONE YEAR OF SERVICE

Three different pavement marking materials were applied along a bike route in Boston, MA, at approximately the same time frame. The photos shown above provide a visual comparison of performance and durability after one year of service.

The advantages of preformed thermoplastic are evident with the block contrast marking completely intact and easily identifiable. With an expected life cycle of 6 to 8 times longer than paint, preformed thermoplastic provides long-term savings but, most importantly, an extended service life and effective safety measure.

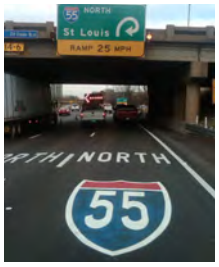
When costs for mobilization, lane closures, adminstrative costs, and application costs are factored in for each repainting cycle, the long-term savings and performance of using preformed thermoplastic proves to be the right choice.



PreMark® Interstate and Route Shields

There has been a growing use of horizontal surface signs in lieu of, or as a supplement to, the typical shoulder-mounted or overhead traffic signs. Standard sizes are 4′ x 10′, 6′ x 15′ and 8′ x 36′.

Many states are discovering these shields help improve traffic flow and safety by providing a clear, concise message to direct motorists to the proper lane before reaching a particular exit or intersection.



PreMark interstate shields are simple to apply because the large marking comes packaged in layout sequence according to the particular design. The different colors of material are interconnected making it easy and convenient to handle and position for application with a propane heat torch or a large infared heater.

PreMark® In-Lane Rumble Bars

Using audible and vibratory signals, PreMark in-lane rumble bars help reduce driver risk and unsafe driving practices due to special road conditions.

The base layer is 125-mil non-beaded PreMark preformed thermoplastic and the top layer is a 250-mil PreMark rumble bar; both layers must be used together. It is effective to use in combination with appropriate signage and word legends.

Situations where rumble bars could be effective include, but are not limited to, high incident areas, approaches to newly-installed stop signs or traffic lights, railroad crossings, signalized controlled intersections, work zones, toll facilities, hazardous curves, and rural high-speed intersections with sight restrictions.

PreMark rumble bars are available in black, white, and yellow. Maintenance is easy as a new rumble bar section can be easily cut to fit any worn or damaged area.

PreMark® Heavy-Duty Adhesives

BUNDY

PreMark adhesives are made out of non-toxic, zero V.O.C., preformed thermoplastic.

Bundy® adhesives adhere raised pavement markers to the road surface and provide a bond that will last throughout the marker's lifetime. Each 5″ x 5″ adhesive is made of 125-mil preformed thermoplastic. When heated with a propane heat torch, the Bundy adhesive liquifies and fuses with the road surface and the marker.

SUPER BUNDY

The SuperBundy® adhesive is designed for applications where the object bonded to the road surface may be hit with extreme force. It has resilient characteristics which enable it to remain flexible throughout its lifetime. It adheres large objects on horizontal surfaces such as tubular markers, wheel stops, large "turtle" markers and buttons. SuperBundy adhesives are available in 2″x39″ strips and 8″x8″ pads.

PreMark® Manhole Protection Rings

BEFORE

AFTER

The PreMark manhole protection ring system offers protection against damage all year round. Road construction, resurfacing, and sewer maintenance can result in manhole covers that do not match the exact grade and crown of the road. PreMark MPRs are designed with a subtle incline that provide a smooth, damage-free ride for daily traffic. They help solve equipment maintenance concerns and potential injury hazards.

Each ring is made of durable, non-beaded, 125-mil PreMark preformed thermoplastic pavement marking material. As many as three rings can be combined to create a smooth transition. Actual ring dimensions depend on the size of the manhole or valve cover.

See the PreMark Preformed Thermoplastic Price List for standard sizes.

PreMark® Handicap Markings

PreMark handicap markings with ViziGrip® visibility and anti-skid treatment are virtually maintenance free. Durable enough to last 6 to 8 times longer than painted surfaces, these high-visibility markings are ADA compliant and offer high skid resistance for pedestrian safety. Although available in a variety of sizes, the standard PreMark handicap kit (40"x40" white symbol on a blue background) is compliant with the FHWA Standard Highway Signs Book.

PreMark handicap marking kits are more convenient to install because the two-colored material is physically held together with a compatible material allowing the user to easily handle and position the marking prior to application.

See the PreMark Preformed Thermoplastic Price List for standard sizes.

PreMark® Storm Drain Markings

PreMark storm drain markings are designed to educate the public and increase awareness about the dangers of pollutants flowing into our water system.

These markings include messages such as "No Dumping!", "Drains to Ocean" or "No Dumping! It Kills". Unlike paint that can actually wash down the drain in a short time, PreMark preformed thermoplastic markings stay in place so your messages remain easy to read and understand.

PreMark storm drain markings with ViziGrip® anti-skid treatment are made of durable preformed thermoplastic and provide enhanced visibility and skid resistance for pedestrian safety.

There are many designs available. The most typical is a 29" x 5"marking with two layers of PreMark preformed thermoplastic which consist of a blue non-beaded base layer and a white beaded stencil top layer.

Ennis-Flint® 3000 EX

The Ennis-Flint 3000 EX propane heat torch is specially designed for applying preformed thermoplastic pavement markings and adhesives. It is recommended for the application of PreMark material and can also be used for the removal of paint, drying loop detector grooves, removal of cold plastic and temporary tape, shrinking plastic for wrapping, drying road surfaces and for melting snow or ice.

SR-28 Reciprocating Infrared Heater

The SR-28 reciprocating infrared heater is engineered specifically for the application and imprinting of asphalt and preformed thermoplastic pavement markings. It is optimized for heating linear material up to 24 inches in width and a variety of symbols and legends.

Magnum Heat Torch

The Magnum propane heat torch has a self-contained torch ignition with a wide mouth and is designed for applying preformed thermoplastic such as HotTape® pavement marking material. Torch assembly must be used with a D.O.T. approved container equipped with a U.L. listed shut-off valve. It is important to always use the two-hand grip handles to properly direct the flame toward the pavement.

Tornado Heat Torch

The Tornado heat torch is an ultra light weight, handheld torch designed to be used comfortably all day long. It has a fast, single-click hose connection and synchronized piezo ignition that means its adjustable flame is readily available with one click of the trigger. The Tornado torch has a low operational noise level. Its low gas consumption makes it economical to operate.

HOTTAPE® by Ennis-Flint

Preheating Surface Required

Preformed Thermoplastic Pavement Markings

- Heavy-duty, durable intersection grade pavement marking material
- Preheating pavement to specific temperature is required
- Complies with MUTCD; used primarily for regulatory markings on public streets, highways and private properties
- Supplied at 125 mil and 90 mil
- Retroreflective; glass beads mixed throughout material so that as the marking wears new beads are exposed
- White and yellow linear material available in rolls
- SkidOptics provides enhanced skid resistance
- Precut and ready to use out of the carton
- Clean, crisp appearance
- Made at ISO 9001:2015 certified facility
- No lead chromate or VOCs
- Quick and simple mobilization; no heavy equipment to set-up and clean
- Simple 3-step application process with Magnum heat torch

DecoMark®

Surface Signs

Typical Colors

WHITE	YELLOW	GREEN	RED	LIGHT BLUE	GREY
ORANGE	EF BIKE LANE GREEN	PURPLE	BLUE	SYG	BLACK

Horizontal Surface Signage

- Durable intersection-grade preformed thermoplastic pavement marking material
- Enhances regulatory transportation and pedestrian guidance; promotes community pride and safety
- Precut; ready to use out of the carton
- Interconnected shapes and colors; easy to handle
- Lasts 6 to 8 times longer than paint
- ViziGrip® visibility and anti-skid treatment provides enhanced visibility and slip resistance
- Material flushes to the surface; no tripping hazard; wheelchair/shopping cart-friendly
- Clean, crisp appearance
- No minimum ambient or road temperature requirements; pavement marking season can be extended into colder months
- Heating indicators in the surface of the material provide visual cue for proper application
- Made at ISO 9001:2015 certified facility
- No lead chromate or VOCs
- Application on asphalt and concrete
- Simple application process with propane heat torch or large infrared heater

ENNIS-FLINT®
The Mark of Traffic Safety®

www.ennisflint.com

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SPECIFICATION
RETROREFLECTIVE AND SKID RESISTANT
PREFORMED THERMOPLASTIC PAVEMENT MARKINGS

1. **USE:** A durable, high skid resistant, retroreflective pavement marking material suitable for use as interstate shields, route shields, bike path, roadway, intersection, airport, commercial or private pavement delineation and markings.

1.1. The markings must be a resilient white, yellow or other color thermoplastic product, the surface of which must contain glass beads and abrasives in an alternating pattern. The markings must be resistant to the detrimental effects of motor fuels, lubricants, hydraulic fluids etc. Lines, legends and symbols are capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of the normal heat of a propane torch.

1.2. The markings must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics, such that it is capable of fusing with itself and previously applied thermoplastic when heated with the torch.

1.3. The markings shall not have minimum ambient and road temperature requirements for application, storage, or handling.

2. **MANUFACTURING LOCATION, CONTROL AND ISO CERTIFICATION:** The marking material must be produced in the United States, and the manufacturer must be ISO 9001:2015 certified for design, development and manufacturing of preformed thermoplastic pavement markings, and provide proof of current certification.

3. **MATERIAL:** Must be composed of an ester modified rosin resistant to degradation by motor fuels, lubricants etc. in conjunction with aggregates, pigments, binders, abrasives, and glass beads which have been factory produced as a finished product, and meets the requirements of the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. The thermoplastic material conforms to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state.

3.1. Graded Glass Beads:

3.1.1. The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to AASHTO designation M247, with minimum 80% true spheres and minimum refractive index of 1.50.

3.1.2. The material must have factory applied coated surface beads and abrasives in addition to the intermixed beads at a rate of 1/2 lb. (.23 kg) [± 20%] per 11 sq. ft. (1 sq. m). The surface beads and abrasives must be applied in an alternating arrangement across the surface of the material so that the surface is covered in what is best described as a "checkerboard" pattern of glass beads and abrasive materials. The abrasive material must have a minimum hardness of 9 (Mohs scale). The factory applied coated surface beads shall have a minimum of 80% true spheres, minimum refractive index of 1.50, and meet the following gradation:

Size Gradation			
US Mesh	Um	Retained, %	Passing, %
12	1700	0 - 2%	98 - 100%
14	1400	0 - 6%	94 - 100%
16	1180	1 - 21%	79 – 99%
18	1000	28 - 62%	38 - 72%
20	850	62 - 71%	29 – 38%
30	600	67 - 77%	23 - 33%
50	300	86 - 95%	5 – 14%
80	200	97-100%	0 - 3%

3.2. Pigments:

3.2.1. White: The material shall be manufactured with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected.

3.2.2. Red, Blue, and Yellow: The material shall be manufactured with sufficient pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. The yellow pigments must be organic and must be heavy-metal free.

3.2.3. Other Colors: The pigments must be heavy-metal free.

3.3. Heating indicators: The top surface of the material (same side as the factory applied surface beads/abrasives) shall have regularly spaced indents. The closing of these indents during application, shall act as a visual cue that the material has reached a molten state allowing for satisfactory adhesion and proper bead embedment, and as a post-application visual cue that the application procedures have been followed.

3.4. Skid Resistance: The surface of the preformed thermoplastic material shall contain factory applied non-skid material with a minimum hardness of 9 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.

3.5. Thickness: The material must be supplied at a minimum thickness of 90 mils (2.29 mm) or 125 mils (3.15 mm).

3.6. Retroreflectivity: The material, when applied in accordance with manufacturer's guidelines, must demonstrate a uniform level of sufficient nighttime retroreflection when tested in accordance to ASTM E 1710. The applied material must have an initial minimum intensity reading of 275 $mcd \cdot m^{-2} \cdot lx^{-1}$ for white, as measured with a Delta pavement marking retroreflectometer.

Note: Initial retroreflection and skid resistance are affected by the amount of heat applied during installation. When ambient temperatures are such that greater amounts of heat are required for proper installation, initial retroreflection and skid resistance levels may be affected.

3.7. Environmental Resistance: The material must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

3.8. Abrasives: The abrasives and surface beads must be applied in an alternating arrangement across the surface of the material so that the surface is covered in what is best described as a "checkerboard" pattern of glass beads and abrasive materials. The abrasive material must have a minimum hardness of 9 (Mohs scale).

4. APPLICATION:

4.1. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied without minimum requirements for ambient and road temperatures and without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry and free of debris. Supplier must enclose application instructions in English and Spanish with each box/package only pertaining to an application method that does not require preheating of the pavement to a specific temperature before application.

4.2. Portland Concrete: The same application procedure shall be used as described under Section 4.1. However, a compatible primer sealer shall be applied before application to assure proper adhesion.

5. **PACKAGING:** The preformed thermoplastic markings shall be placed in protective plastic film with cardboard stiffeners where necessary to prevent damage in transit. Linear material must be cut to a maximum of 3 ft. (.91 m) long pieces. Legends and symbols must also be supplied in flat pieces. The cartons in which packed shall be non-returnable, shall contain a minimum of 35% post-consumer recycled materials, shall not exceed 40 in. (1.02m) in length and 25 in. (.64 m) width, and shall be labeled for ease of identification. The weight of the individual carton must not exceed 70 lb. (32 kg). A protective film around the box must be applied in order to protect the material from rain or premature aging.

6. **TECHNICAL SERVICES:** The successful bidder shall provide technical services as required. Regionally-located manufacturer's representative, employed directly by the manufacturer, can provide no-cost on-site training for proper application.

EF Series

Permaline® Thermoplastic

PRODUCT DATA

Product Type:	**Permaline Alkyd Extrude Thermoplastic**	
Product Code:	**884094**	**884028**
Product Color:	White	Lead Free Yellow
Description:	TM WHT ALK PL EXTRD	
	TM LF YEL ALK PL EXTRD	
Specification:	Meets AASHTO M-249	
Effective Date:	August 15, 2013	

Product Description:
Ennis-Flint's Permaline Alkyd Extrude Thermoplastic Pavement Marking Material is a 100% solids material blend of binder, pigments and glass beads that must be melted to a temperature of at least 425˚F (218˚C), mixed well and applied in a molten/liquid state to the pavement. Roadway surface temperature at the time of application should be 50˚F (10˚C) and rising. Upon cooling to normal pavement temperature, Permaline provides a very durable marking material for high volume traffic areas.

Product Advantages:

- Improved durability over standard thermoplastic
- Can be used on newer concrete without primer
- Demonstrates excellent bead retention and abrasion resistance
- Fast set up keeps traffic control to a minimum when striping
- Can be used for symbols, legends and lane marking

Packaging:
Thermoplastic is sold in one ton increments (2000 pounds). The ton is divided into 40 heat degradable bags each weighing approximately 50 pounds.

Storage:
The shelf life of the product is one year from date of manufacture with proper storage. Proper storage includes inside or covered to prevent from moisture, and below 120F. Outside storage for short intervals is acceptable as long as the material is kept dry. The older the material, more agitation and dwell time is required to fully melt and mix the granular ingredients.

Conditions for Application:
All surfaces must be clean, dry and free from oil, grease, antifreeze, loose sand, aggregate and chipping/peeling existing striping. Any curing compounds used on new concrete must be mechanically abraded off prior to striping and use of a primer is strongly suggested. Concrete should be allowed to cure 14 days. When in doubt, always test adhesion. While thermoplastic may be installed behind the paver once the mat cools, new asphalt should be allowed to cure for a minimum of 14 days to maximize adhesion and durability.

Coverage:
One tons yields approximately 6000 feet of 4" stripe @ 90 mils – surface texture will decrease the yield.

Physical Characteristics:

% Binder	**23% minimum**
% Glass:	**30-40%**
Intermix glass spec:	**M-247 type I**
% TiO2 in the white:	**10% minimum**
595B color, white:	**17886**
595B color, yellow:	**13538**
White Reflectance (Y value):	**75 minimum**
Yellow Reflectance (Y value):	**45 minimum**
Hardness, Shore A2 @115⁰F:	**50 minimum**
Softening Point:	**200-230°F**
Yellowness index, white:	**0.12 maximum**

Dry Time: With drop on glass beads applied, the Permaline thermoplastic material shall be sufficiently tack-free to carry traffic in not more than 2 minutes when pavement surface temperature is at 50˚F, and not more than 10 minutes when pavement surface temperature is 130ºF.

Limitations: Applying a test strip to determine if surface is dry enough if there has been rain in the last 24 hours.

- Do not apply if hot material shows moisture bubbles.
- Do not heat thermoplastic above 450°F.
- Do not apply when road and ambient temperatures are below 50°F.
- Do not apply when temperatures are near or below the dew point.
- Material at application is hot – please wear personal protective equipment as described in MSDS

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